



TFT LCD Approval Specification

MODEL NO.:V201V1-P01

Customer: _____

Approved by: _____

Note:

LCD TV Head Division	
AVP	郭振隆

QRA Dept.	TVHD / PDD		
	DDIII	DDII	DDI
Approval	Approval	Approval	Approval
廖健宏	李汪洋	藍文錦	林文聰

LCD TV Marketing and Product Management Division	
Product Manager	羅仲良

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**CHI MEI**
OPTOELECTRONICS CORP.

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Model No.: V201V1-P01

Approval**REVISION HISTORY**

Version	Date	Page (New)	Section	Description
Ver 2.0	May.12, 2006	All	All	Approval Specification was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V201V1-P01 is a 20-inch TFT LCD cell with driver ICs and a 50-pin-and-1ch-TTL interface. The product supports 640 x 480 VGA mode and can display true 0.26M colors (6-bit/color). The backlight unit is not built in.

1.2 Characteristics

CHARACTERISTICS ITEMS	SPECIFICATIONS
Screen Diagonal [in]	20.1

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASED ON CMO MODULE V201V1-T03)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T _{OP}	0	+50	°C	(1), (2)

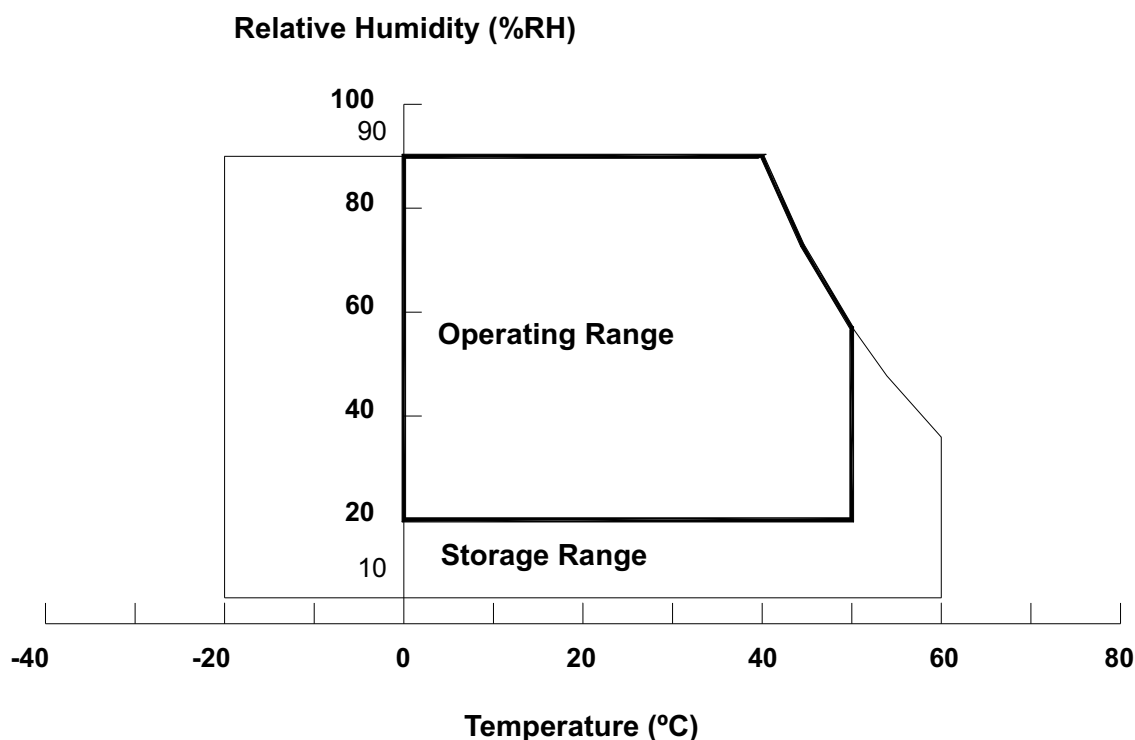
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40$ °C).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 °C Min. and 60 °C Max.



2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

High temperature or humidity may reduce the performance of panel. Please store LCD panel within the specified storage conditions.

Storage Condition: With packing.

Storage temperature range: 25 ± 5 °C.

Storage humidity range: $50 \pm 10\%$ RH.

Shelf life: 30days

2.3 ELECTRICAL ABSOLUTE RATINGS (OPEN CELL)

Item	Symbol	Value		Unit	Note
		Min	Max		
Power Supply Voltage	V_{CC}	-0.3	+6.0	V	(1)
Logic Input Voltage	V_{IN}	-0.3	4.3	V	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

3. ELECTRICAL CHARACTERISTICS

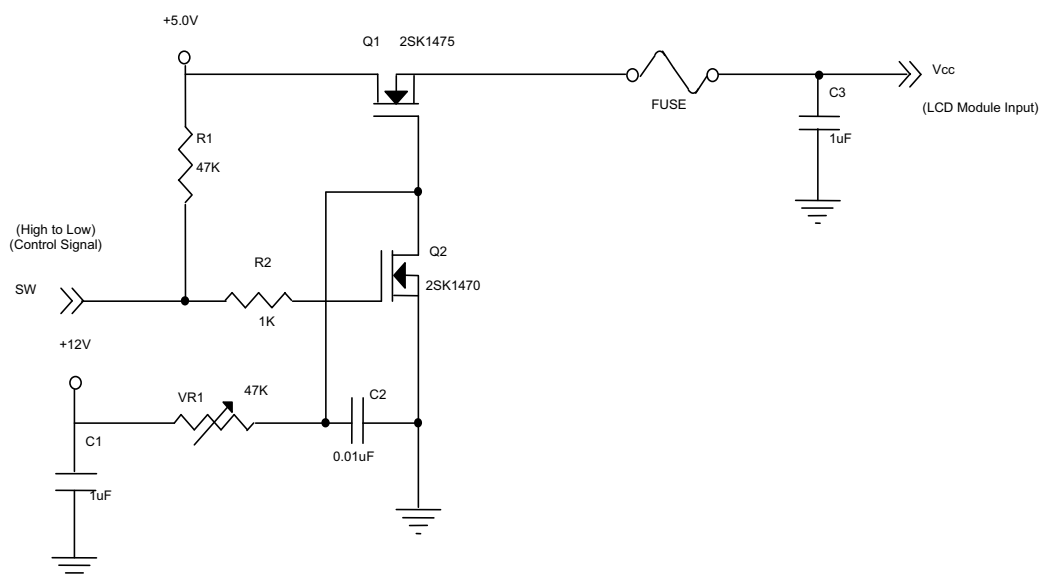
3.1 TFT LCD OPEN CELL

 $T_a = 25 \pm 2^\circ\text{C}$

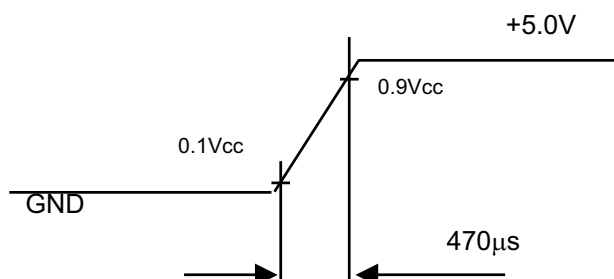
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V_{CC}	4.5	5.0	5.5	V	(1)
Ripple Voltage	V_{RP}	-	100	-	mV	(2)
Rush Current	I_{RUSH}	-	2.5	3	A	
Power Supply Current	White	-	0.2	-	A	(3)
	Black	-	0.3	-	A	
	Vertical Stripe	-	0.26	-	A	
TTL input high threshold voltage	V_{IH}	2.3	-	3.3	V	
TTL input low threshold voltage	V_{IL}	0	-	1	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:

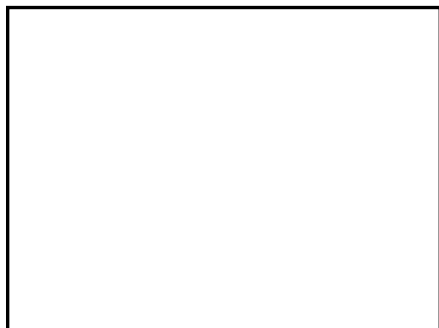


Vcc rising time is 470μs



Note (3) The specified power supply current is under the conditions at $V_{CC} = 5.0\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



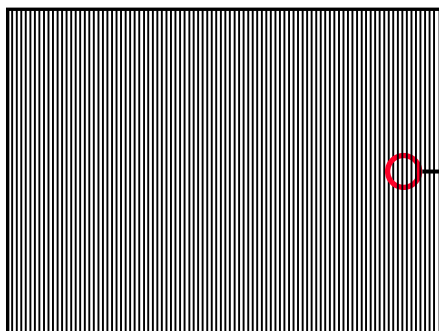
Active Area

b. Black Pattern

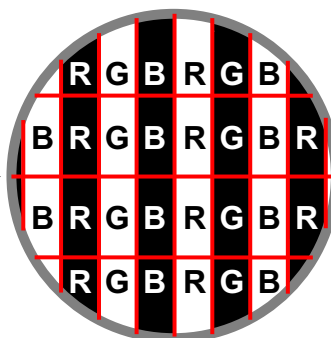


Active Area

c. Vertical Stripe Pattern

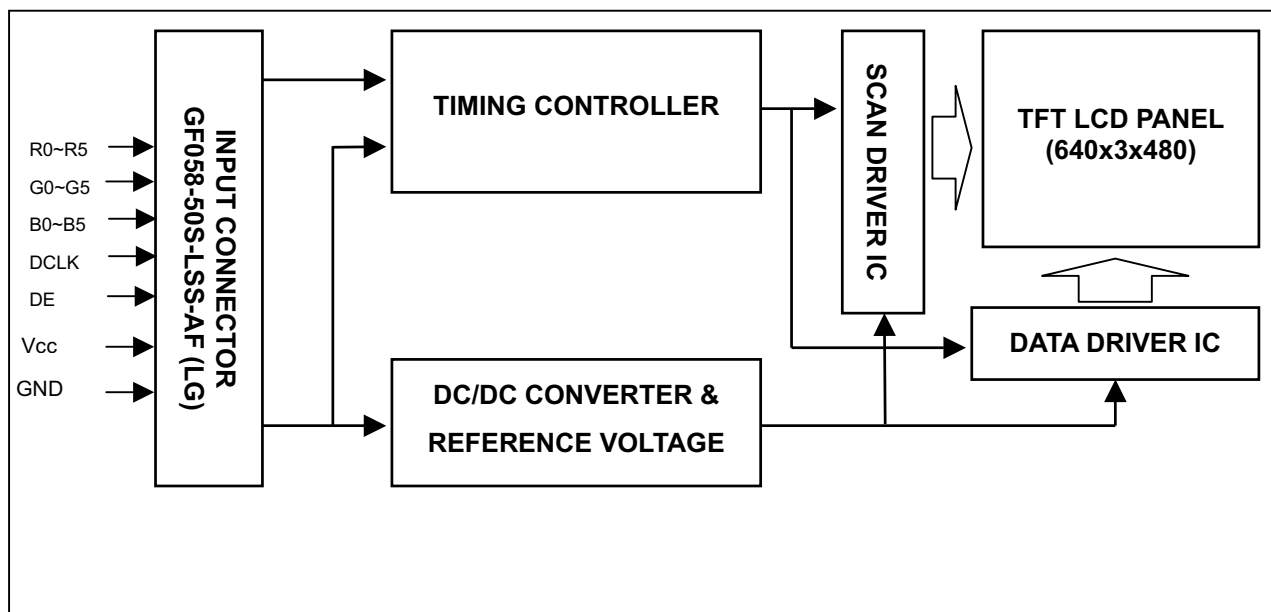


Active Area



4. BLOCK DIAGRAM

4.1 TFT LCD OPEN CELL



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin assignment

Pin	Name	Description	Pin	Name	Description
1	NC		26	NC	
2	NC		27	GND	Ground
3	NC		28	G5	Green Data (G5:MSB)
4	GND	Ground	29	G4	
5	GND	Ground	30	G3	
6	VCC	Power Input (+5.0V)	31	G2	
7	VCC		32	GND	Ground
8	VCC		33	G1	Green Data
9	VCC		34	G0	
10	GND	Ground	35	NC	
11	NC		36	NC	
12	NC		37	GND	Ground
13	GND	Ground	38	B5	Blue Data (B5:MSB)
14	DE	Data Enable	39	B4	
15	GND	Ground	40	B3	
16	DCLK	Dot Clock	41	B2	
17	GND	Ground	42	GND	Ground
18	R5	Red Data (R5:MSB)	43	B1	Blue Data
19	R4		44	B0	
20	R3		45	NC	
21	R2		46	NC	
22	GND	Ground	47	GND	Ground
23	R1	Red Data	48	GND	Ground
24	R0		49	NC	
25	NC		50	NC	

Note (1) Connector Part No.: GF058-50S-LSS-AF (LG) or compatible

5.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(62)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red(64)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(62)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
Green(64)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	:	0	0	0	0	0	:	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	0	:	:	:	:	:	:	0	:	:	:	:	:	:
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Blue(64)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	

Note (1) 0: Low Level Voltage, 1: High Level Voltage

6. INTERFACE TIMING

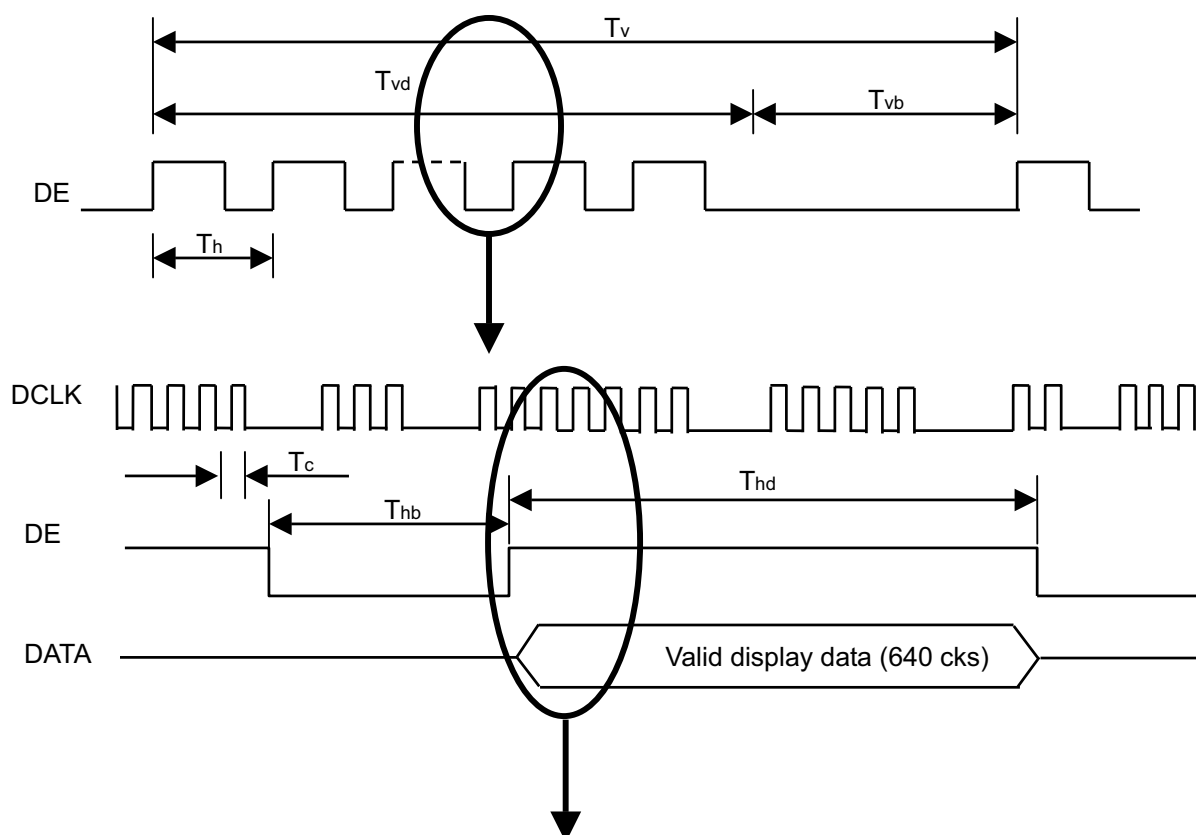
6.1 INPUT SIGNAL TIMING SPECIFICATIONS

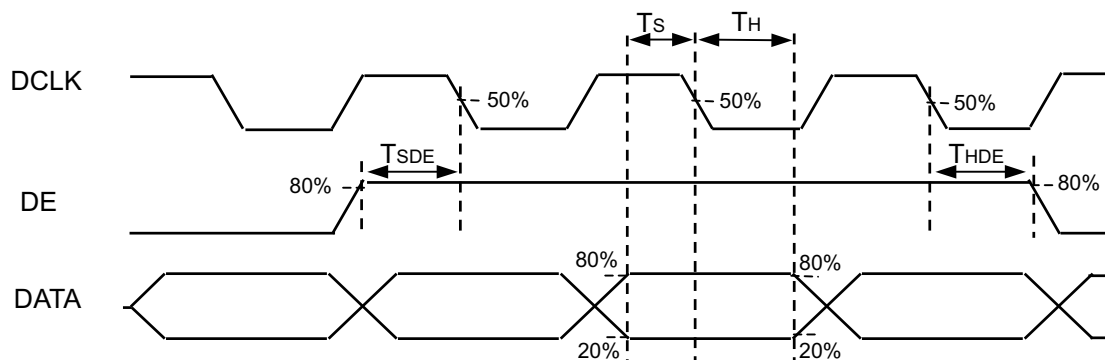
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Clock	Frequency	1/Tc	20	25	30	MHz	-
	Input Cycle to Cycle jitter	Trcl	--	--	300	ps	-
Vertical Active Display Term	Frame Rate	Fr	50	60	70	Hz	-
	Total	Tv	500	525	550	Th	Tv=Tvd+Tvb
	Display	Tvd	480	480	480	Th	-
	Blank	Tvb	20	45	70	Th	-
Horizontal Active Display Term	Total	Th	700	800	900	Tc	Th=Thd+Thb
	Display	Thd	640	640	640	Tc	-
	Blank	Thb	60	160	260	Tc	-
Input data Term	Setup time	Ts	15	--	--	ns	
	Hold time	TH	10	--	--	ns	
DE Term	Setup time	TSDE	15	--	--	ns	
	Hold time	THDE	10	--	--	ns	

Note: Since this module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

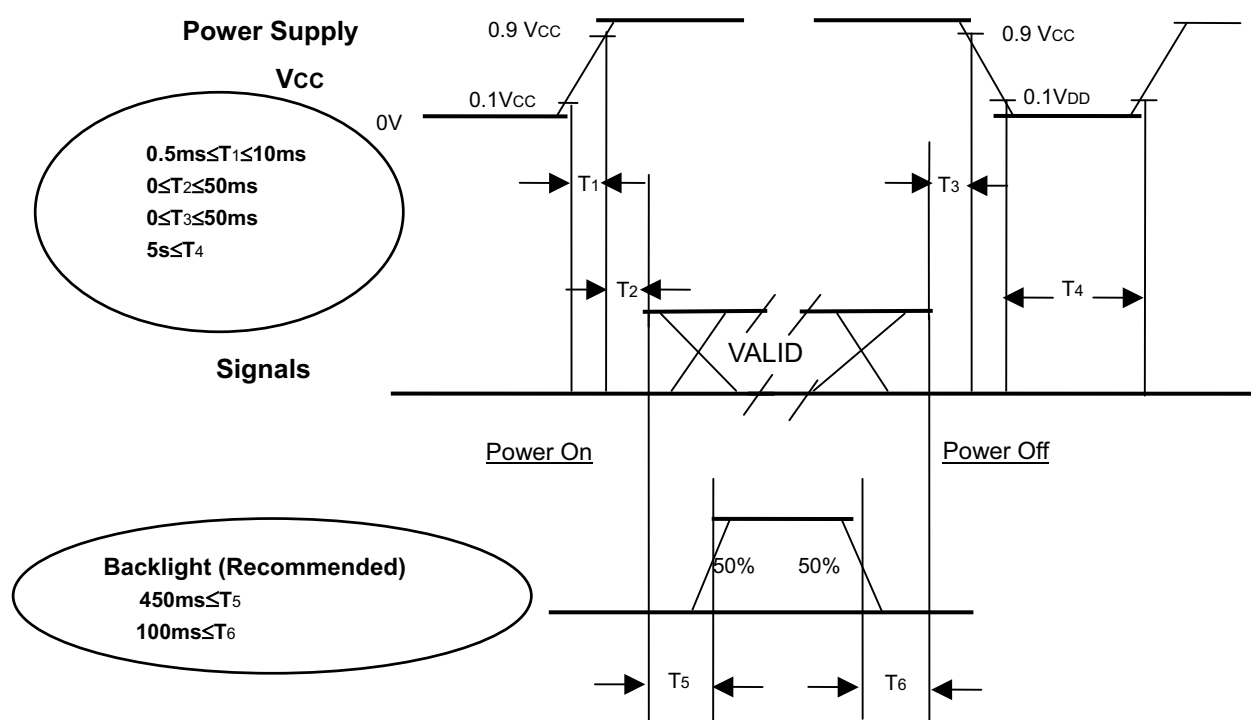
INPUT SIGNAL TIMING DIAGRAM





6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should follow the conditions shown in the following diagram.



Power ON/OFF Sequence

Note.

- (1) The supply voltage of the external system for the module input should be the same as the definition of V_{CC} .
- (2) Please apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation of the LCD turns off, the display may, instantly, function abnormally.
- (3) In case of $v_{cc} = \text{off level}$, please keep the level of input signals on the low or keep a high impedance.
- (4) T_4 should be measured after the module has been fully discharged between power on/off periods.
- (5) Interface signal shall not be kept at high impedance when the power is on.

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I _L	6	mA
Inverter Driving Frequency	F _L	55	KHz

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rcx	$\theta_x=0^\circ, \theta_Y=0^\circ$ Viewing Normal Angle Standard light source “C”	-	0.655	-	-	(0),(5)
		Rcy			0.330		-	
	Green	Gcx			0.275		-	
		Gcy			0.593		-	
	Blue	Bcx			0.132		-	
		Bcy			0.116		-	
	White	Wcx			0.302		-	
		Wcy			0.354		-	
Center Transmittance		T%	$\theta_x=0^\circ, \theta_Y=0^\circ$ with CMO Module	-	7.2	-	%	(1), (7)
Contrast Ratio		CR			600	-	-	(1), (3)
Response Time		T _R	$\theta_x=0^\circ, \theta_Y=0^\circ$ with CMO Module@60Hz	-	3	-	ms	(4)
		T _F		-	5	-	ms	
White Variation		δW	$\theta_x=0^\circ, \theta_Y=0^\circ$ with CMO Module	-	-	1.6	-	(1), (6)
Viewing Angle	Horizontal	θ _x ⁺	CR≥10 with CMO Module	-	80	-	Deg.	(1), (2)
		θ _x ⁻		-	80	-		
	Vertical	θ _Y ⁺		-	70	-		
		θ _Y ⁻		-	60	-		

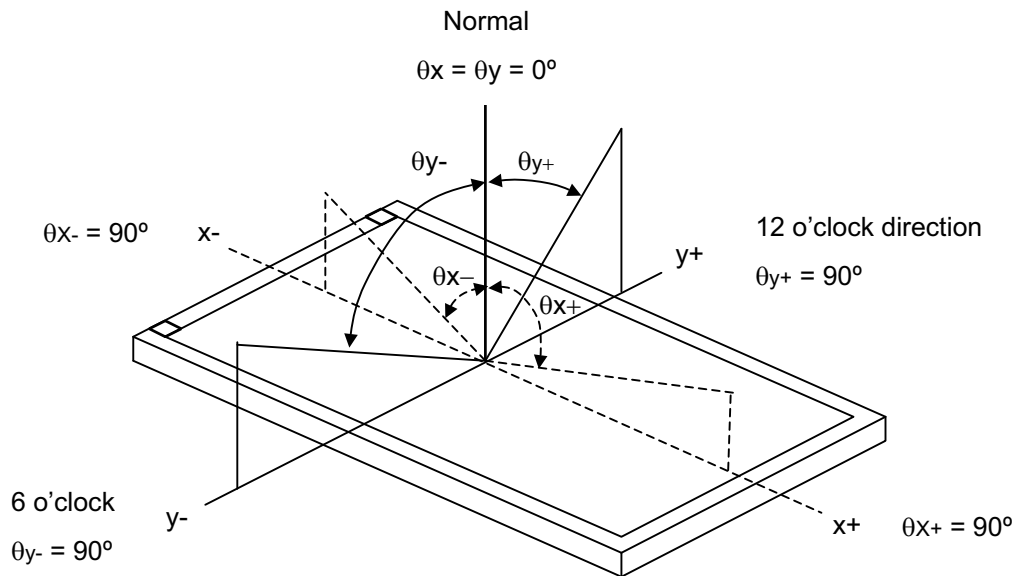
Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following :

1. Measure Module's and BLU's spectrums. White is without signal input and R, G, B are with signal input. BLU(for V201V1-T03) is supplied by CMO.
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C"

Note (1) Light source is the BLU which is supplied by CMO and driving voltages are based on suitable gamma voltages.

Note (2) Definition of Viewing Angle (θ_x , θ_y):

Viewing angles are measured by EZ-Contrast 160R (Eldim)



Note (3) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

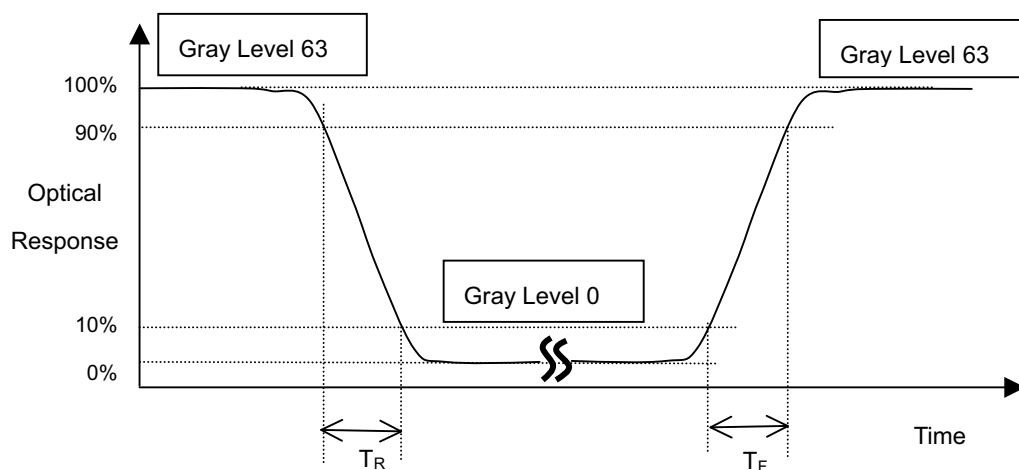
$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

L63: Luminance of gray level 63

L 0: Luminance of gray level 0

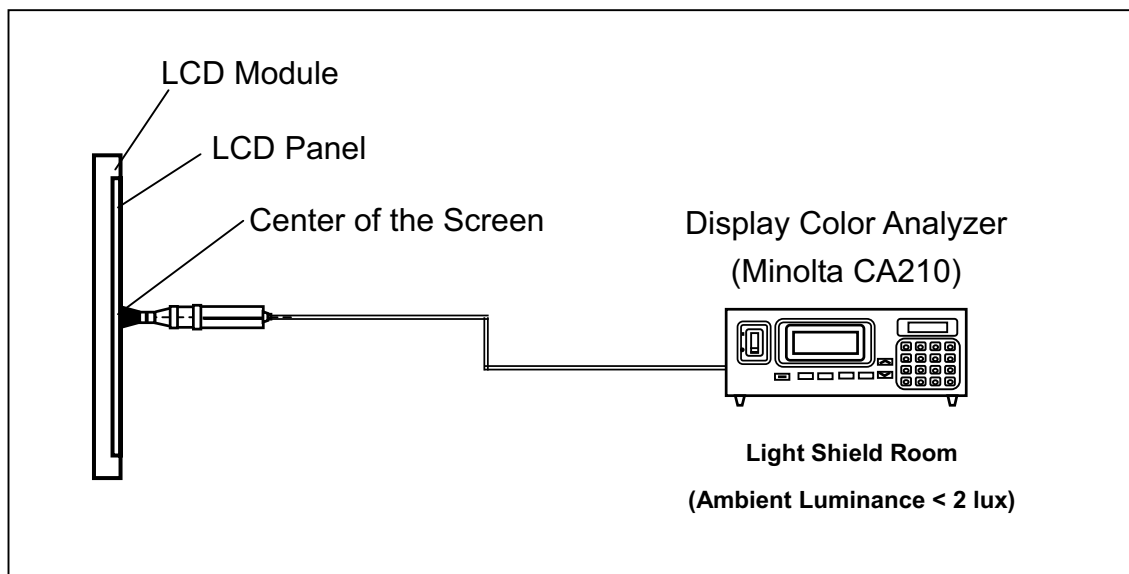
$CR = CR(1)$, where $CR(X)$ is corresponding to the Contrast Ratio of the point X at the figure in Note (6).

Note (4) Definition of Response Time (T_R , T_F):



Note (5) Measurement Setup:

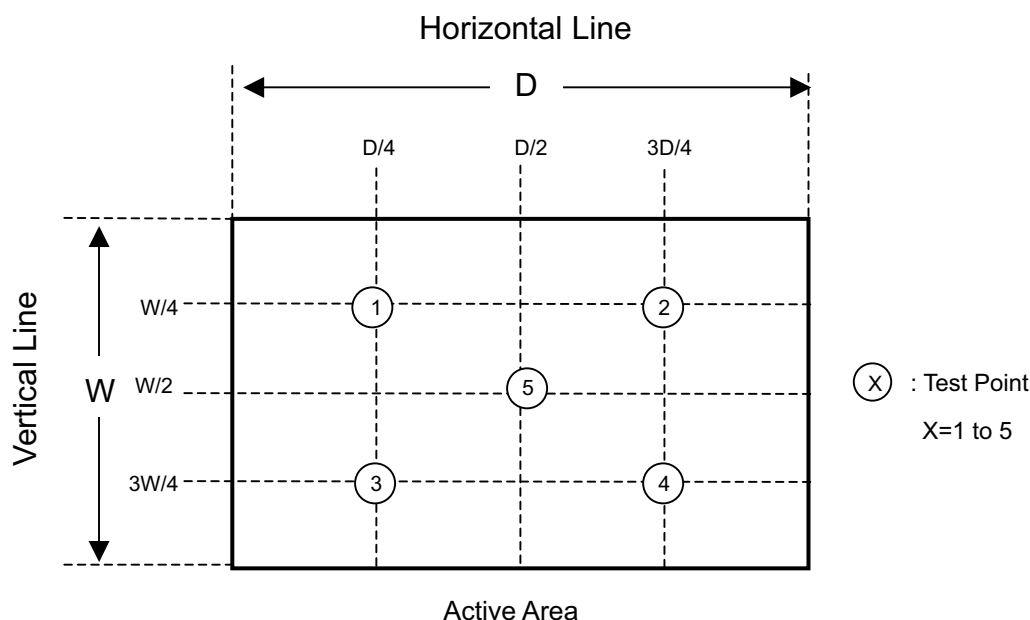
The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 63 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum} [L(1), L(2), L(3), L(4), L(5)]$$



Note (7) Definition of Transmittance($T\%$):

Module is without signal input.

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

8. PACKAGING

8.1 PACKING SPECIFICATIONS

- (1) 15 LCD TV Panels / 1 Box
- (2) Box dimensions : 638 (L) X 558 (W) X 375 (H)
Weight : approximately 16.5Kg (15 panels per box)

8.2 PACKING METHOD

Figures 8-1 and 8-2 are the packing method

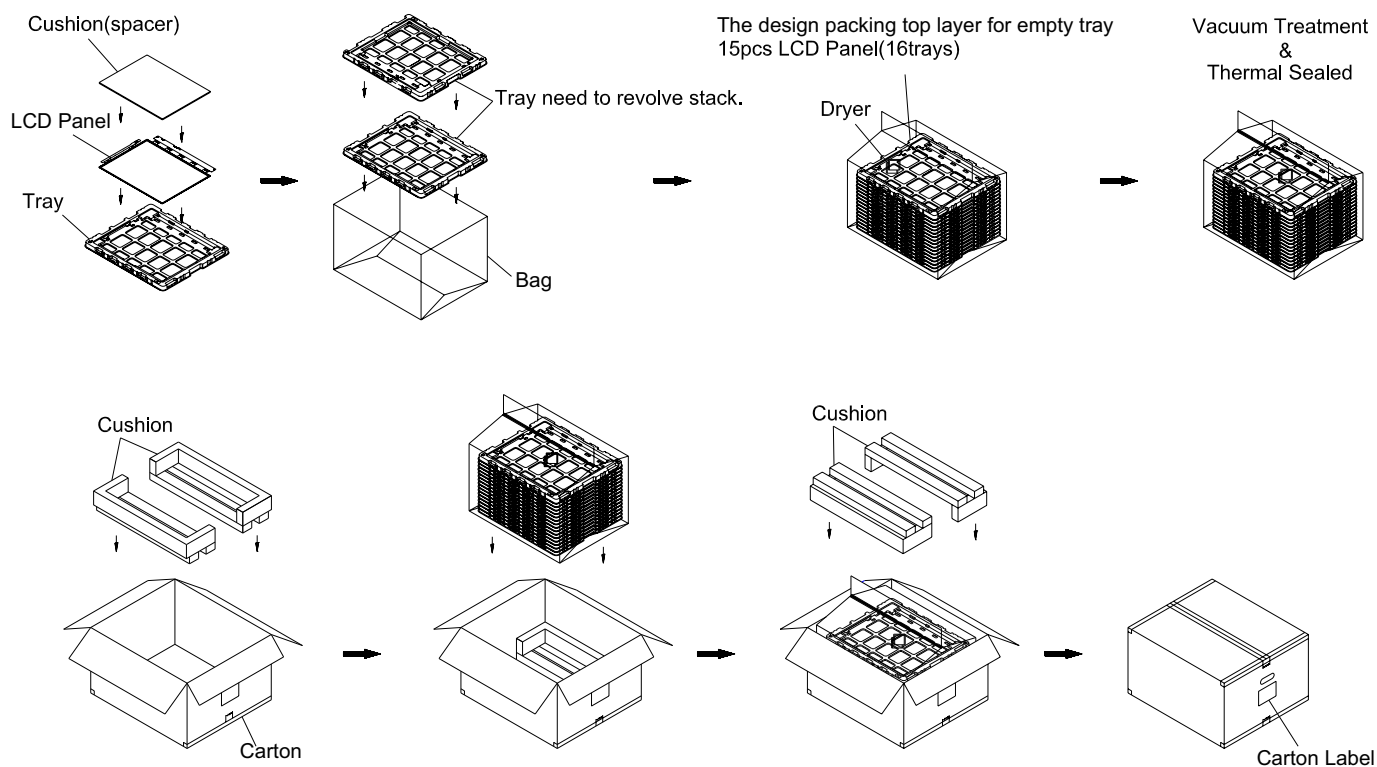


Figure.8-1 packing method

Air Transportation

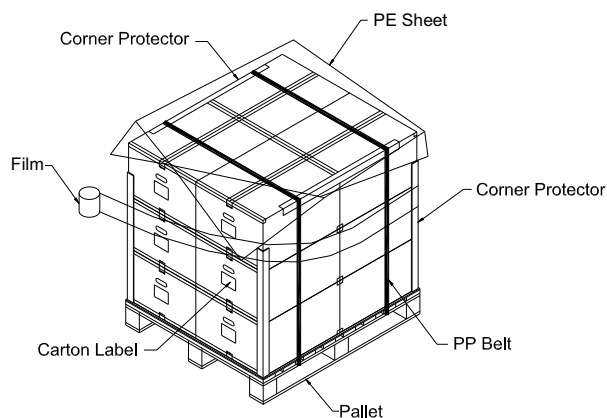
Corner Protector:L1000*50*50mm

L1130*50*50mm

Pallet:L1300*W1140*H140mm

Pallet Stack:L1300*W1140*H1265mm

Gross:210kg



Sea Transportation

Corner Protector:L1400*50*50mm

L1130*50*50mm

Pallet:L1300*W1140*H140mm

Pallet Stack:L1300*W1140*H1640mm

Gross:310kg

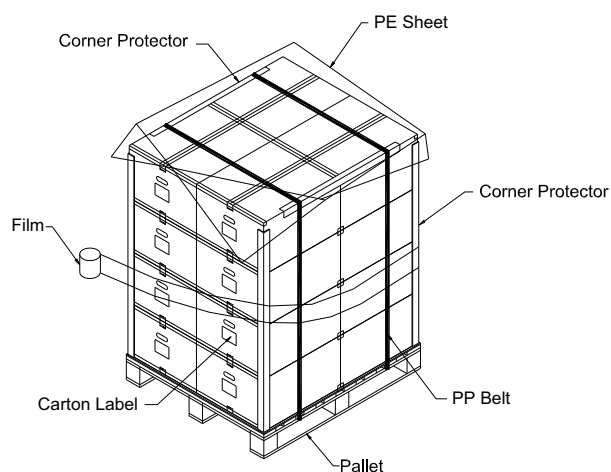


Figure.8-2 packing method

9. DEFINITION OF LABELS

9.1 OPEN CELL LABEL

The barcode nameplate is pasted on each open cell as illustration for CMO internal control.



9.2 CARTON LABEL

The barcode nameplate is pasted on each box as illustration, and its definitions are as following explanation

A form for a carton label with the following fields: PO.NO. _____, Part ID. _____, Model Name V201V1 -P01, Carton ID. _____, Quantities 15, and a barcode with the text 28A110164C2001 below it. The text "Made in Taiwan" is at the bottom.

PO.NO. _____

Part ID. _____

Model Name V201V1 -P01

Carton ID. _____ Quantities 15

28A110164C2001

Made in Taiwan

- (a) Model Name: V201V1– P01
- (b) Carton ID: CMO internal control
- (c) Quantities: 15

10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the product during assembly.
- (2) To assemble backlight or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the module because the LCD panel will be damaged.
- (4) Always follow the correct power sequence when the product is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the module is operating.
- (6) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (7) It is dangerous that moisture come into or contacted the product, because moisture may damage the product when it is operating.
- (8) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage conditions.
- (9) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly.

10.2 SAFETY PRECAUTIONS

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the product's end of life, it is not harmful in case of normal operation and storage.

11. Mechanical Drawing

